



SPACE BRIEF

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Introduction

Microchip and Microsemi combine resources to address the needs of the Space community

Many readers may already be aware that Microchip Technology Inc. acquired Microsemi Corporation in May 2018. Microchip has served the space community for over 30 years with a range of radiation-hardened and radiation-tolerant processors, memory products, custom ASICs, and standard products including SpaceWire routers and GNSS processors, with qualification to QML class Q, QML class V, and ESCC standards. You can learn more about Microchip space products [here](#).

Microchip's space products team brings a wealth of expertise and a set of products that are complementary to Microsemi's FPGAs, mixed-signal integrated circuits, clocks, oscillators, discrete semiconductors, and power converters. The Microsemi and Microchip product teams are already working together to identify areas for collaboration. In future editions of Space Brief, we hope to bring you news of new interoperation demos, reference designs, and joint developments, making use of the synergies between the two teams.

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Product News

RTG4 FPGAs Achieve QML Class V Qualification



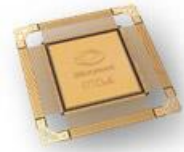
We are delighted to announce that our RTG4 high-speed signal processing radiation-tolerant FPGA family has achieved Qualified Manufacturers List (QML) Class V qualification by the Defense Logistics Agency (DLA). This qualification validates the quality and reliability of RTG4 for the most critical space missions.

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For more information, see [press release](#).

RTG4 CQ352 Status Update

We have introduced a ceramic quad flat pack (CQFP) package with 352 pins for the RTG4 FPGA family to provide more cost-effective integration than that of higher pin count packages. CQFP is the industry-standard package for space applications with well-established board integration and inspection procedures.



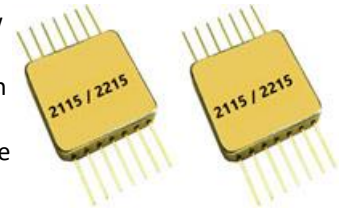
RTG4 devices in CQ352 packages are available in the Libero SoC software tool set, allowing customers to design with this new device package combination. We recommend customers download the latest version of [Libero SoC software](#) for the recent update to the pin assignments. RTG4 CQ352 Proto devices are available now subject to lead times. Proto devices have the same package design as flight units and are tested across the full military temperature ranging from -55°C to 125°C. B-flow and E-flow space flight units are expected in early 2019, when the MIL-STD-883 Class B qualification is completed for RTG4 CQ352. Upon qualification, RTG4 CQ352 in B-flow and E-flow will be added to the [SMD](#) from DLA.

For more information, contact **Minh U. Nguyen**, Marketing Manager, Space FPGAs, SoC Products Group. Minh.Nguyen@microchip.com



Meet Microsemi's New 2115/2215 Sinewave TCXO, the Smallest Space TCXO on the Market

Microsemi's new 2115/2215 sinewave TCXOs sets the standard for small size, low power, and wide frequency range. The design and manufacturing processes have been optimized to meet the demanding 100 krad tolerant requirements for use in deep space applications. The 2115/2215 specifications — including device screening, output format, temperature stability, and supply voltage options — are now part of [DOC200103, Rev G](#) which can be downloaded [here](#).



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For further information, contact **Scott Murphy**, Space Product Line Manager, Piezo Oscillator Products. Scott.Murphy@microchip.com



COTS to Rad Tolerant Microchip Products for New Space Challenges



Developing radiation-hardened systems for space applications has a history of long lead times and high cost towards achieving the necessary levels of reliability for multi-year missions in harsh environments. A growing number of NewSpace and other critical aerospace missions require faster development and reduced costs. Until recently, the only alternatives to expensive radiation hardened devices were pure commercial off-the-shelf (COTS) devices or upscreened variants: the former being inherently risky and the latter costly and time consuming. Microchip, recently, introduced an approach that combines the low-cost access of a COTS device with the benefits of wide market deployment and development facilities, as well as an improved level of radiation tolerance.

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For more information, contact **Nicolas Ganry**, Marketing Manager, Aerospace. Nicolas.Ganry@microchip.com



Bipolar Transistors Radiation Effects and 5 Month Lead-Time Reduction Initiative

In the last edition of [Space Brief](#), I discussed how Total Ionizing Dose (TID) performance could vary wafer-to-wafer for bipolar transistors. If radiation-qualified bipolar transistors are not available for a satellite build, then delays can be significant, totaling 7 months or more if the die has to be fabricated, packaged, and radiation

tested. To avoid this issue, Microsemi continues to build and pre-qualify die banks of our popular bipolar transistors to ensure our customers are not waiting for 100 krad (10 mrad/sec) radiation lot acceptance test data on these products.

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For more information, contact **Chris Hart**, Director of Marketing and Applications, Aerospace and Defense Products, Discrete and Power Management. Chris.Hart@microchip.com



Microsemi Nears Sampling of LX7712 RT Power Line Protection Device

We are currently evaluating first silicon of our new LX7712 IC. This is a radiation-tolerant-by-design power line protection device for spacecraft applications that can be configured as a latchable current limiter or a fold-back current limiter. It provides a means to turn a DC load on or off with current up to 5 A. The LX7712 includes a solid-state P channel MOSFET switch and catch diode; integration allows the temperature of the switch to trigger an optional thermal shutdown. The LX7712 can be configured with just a few external components and multiple devices can be paralleled in a master/slave arrangement to increase the current rating. It is packaged in a 48-pin hermetic HTF package. Samples will be available in calendar Q4 2018.

For more information, contact **Dorian Johnson**, Product Marketing Manager, Mixed Signal and ASIC High-Reliability. Dorian.Johnson@microchip.com



Product Updates and Notifications

Microsemi's Space Chip-Scale Atomic Clock Update: Customers Appreciate Careful COTS Design

As we continue to introduce Space CSAC to the market, it is important to point out that customers bring varying requirements when seeking an atomic reference for space missions and they share a curiosity about how the CSAC becomes a Space CSAC. So, while Space CSAC is a commercial off-the-shelf (COTS) part available with short lead times, it is important to note that Microsemi manufactures Space CSAC using Careful COTS methods. Careful COTS bridges the gap between pure COTS and full rad-hard space grade.

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For further information, contact **Stewart Hampton**, Product Line Manager, Clocks Group Stewart.Hampton@microchip.com



RISC-V in Aerospace and Defense Applications

EE Times recently published a short discussion on the advantages of processors using the RISC-V open instruction set architecture (ISA) in Aerospace and Defense applications. The advantages offered by this open ISA to optimize utilization and performance, and the availability of inspectable code, are particularly important for space applications. The article is published [here](#).

For further information, contact **Ken O'Neill**, Director of Marketing, Space and Aviation, SoC Products Group. Ken.O'Neill@microchip.com



Microsemi RTG4 Datasheet Update

Microsemi published Version 5 of the [RTG4 Datasheet](#) in August 2018 with the following updates:

- RTG4 device status was updated
- Maximum input buffer jitter was added
- Differential Input signaling waveform diagram was added
- RAM1K18 - Dual-Port Mode for Depth x Width Configuration 1Kx18 was updated

- Fabric PLL output clock jitter specification was added
- A footnote about input leakage current of VREF was added
- FPGA operating limits was updated
- Receiver parameters was updated
- A footnote about AC transient limit of VDD and VDDI was added
- Timing diagram of Spacewire characteristics was added
- Tristate leakage current (IOZ) was added
- Combinatorial cell propagation delays were updated
- Replaced ramp rate with ramp time for DEVRST_N characteristics
- JTAG AC timing was added
- DEVRSTN to functional timing waveform diagram was updated

For questions, contact **Julian Di Matteo**, Product Marketing Engineer, Space and Aviation, SoC Products Group. Julian.DiMatteo@microchip.com



RTG4 Radiation Tolerant FPGA Product Change Notifications

Microsemi recently published two product change notifications (PCNs) affecting RTG4 FPGAs. We encourage designers working on RTG4 designs to view the PCNs on the Microsemi website, at the following locations:

[RTG4 family important changes](#)

[RTG4 LSRAM Read-before-Write mode data errors](#)

For US customers who subscribe to the GIDEP system, these two PCNs have also been published as GIDEPs, with reference numbers SC7-C-18-0001 and SC7-C-18-0002.

For general PCN information, see our [website](#)

For further information, contact Ken.O'Neill@microchip.com or Minh.Nguyen@microchip.com

RTG4 FPGA Radiation Update

Radiation testing of the RTG4 RT FPGA family continues. We recently posted proton single event effect test results on the [Microsemi](#) web page.

Other tests conducted include single event effects in the PLL in heavy ions, reprogramming in heavy ions, reprogramming in neutrons, and power-up cycles in heavy ions. Formal reports on these tests are in the process of being written and are not yet available. However, an overview of the results can be obtained on request from Microsemi.

Additional tests are planned in the coming months. RTG4 FPGA features that will be tested include PLL, SERDES, and DDR controller.

Email your requests to Ken.O'Neill@microchip.com, Minh.Nguyen@microchip.com, or Julian.DiMatteo@microchip.com.

RT FPGA Radiation Reports Now Available in One Place

We have made a number of updates to our radiation-tolerant (RT) FPGA web pages to ensure easier access to radiation reports. This means all RT FPGA radiation reports can be found under the [Radiation and Reliability Data](#) webpage. TID and SEE reports are now listed under individual tabs and organized by product family such as RTG4, RTAX-S/SL/DSP, RT ProASIC3, RTSX-S/SU, and RT Legacy. The old "Conference Reports" section has been removed and reports have been integrated under TID and SEE sections, respectively.

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For comments and questions on the radiation web page restructure, contact **Maria Zaitchenko**, Product Marketing Intern, Space and Aviation, SoC Products Group. Maria.Zaitchenko@microchip.com



Microsemi and Microchip Appearances and Events

Microsemi LX7720 in the Spotlight at RADECS

Our new LX7720 Power Driver with Rotation and Position Sensing was showcased at the recent Radiation Effects on Components and Systems (RADECS) conference held in Gothenburg, Sweden (September 16 – September 21, 2018). The aim of the RADECS conference is to provide an annual European forum for the presentation and discussion of the latest advances in the field of radiation effects on electronic devices, circuits, sensors, and systems.

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Contact Dorian.Johnson@microchip.com to obtain a copy of the test results.

Since our last edition of Space Brief, Microsemi participated in several conferences providing important updates on our entire space portfolio:

- [Radiation Effects on Components and Systems \(RADECS\), Gothenburg, Sweden. September 16 – 21, 2018:](#)

The aim of RADECS conferences is to provide an annual European forum for the presentation and discussion of the latest advances in the field of radiation effects on electronic devices, circuits, sensors, and systems.



- Microsemi exhibited and presented Single Event Effects radiation test results for LX7720 Motor Control Manager

To obtain a copy of the test results, contact Dorian.Johnson@microchip.com

- [Workshop on High-End Digital Processing Technologies and EEE Components for Future Space Missions at European Space Agency \(ESA\) Noordwijk, NL October 1, 2018](#)

This workshop brought together key European stakeholders requiring access to high-end DSP technologies for space applications.



- Microsemi and Microchip presented their vision for space programs, which do not require traditional QML-screened EEE components

To obtain a copy of the presentations, contact Dorian.Johnson@microchip.com, Ken.O'Neill@microchip.com, or Nicolas.Ganry@microchip.com

- [Microelectronics Workshop \(MEWS\) at Japan Aerospace Exploration Agency \(JAXA\) Tsukuba, Ibaraki, Japan November 8 and 9, 2018](#)

- Microsemi will present RTG4 FPGAs and Space System Managers – Update on Qualification, Reliability and Radiation



To obtain a copy of the presentation, contact **Minh Nguyen**: Minh.Nguyen@microchip.com

Thank you for reading. Do not hesitate to forward Space Brief to your colleagues. They can subscribe to receive future editions [here](#).

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